

AVIATION

The Oldest American Aeronautical Magazine



MAY, 1933

SPRING MARKETING

SPRING IS HERE, and for the first time in three years the traditional "spring rise" in business is appearing on schedule. There is real sign of an upturn. We really seem to be on our way out of the depression, and as we begin the long climb the recipients of new profits are going to think about spending them on, among other things, aircraft and air travel.

THE beginning of recovery calls for the beginning of a new drive in the aviation business. In the Spring Marketing issue of AVIATION, we are introducing the industry and its present products to the market that we believe exists.

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The new Curtiss-Wright CONDOR



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GENERATORS AND LANDING
GEAR MOTORS ARE USED IN THE
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AVIATION

The Oldest American Aeronautical Magazine

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McGraw-Hill Publishing Company, Inc., 330 West 42d St., New York, N. Y.

1200 South Michigan Avenue
CHICAGO, ILL.

485 Madison Avenue
NEW YORK, N. Y.

485 Madison Avenue
SAN FRANCISCO

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DOUGLAS AMPHIBION



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THE Curtiss Aeroplane & Motor Company, Inc., Buffalo, New York, has placed one of the largest military aircraft plants in the world at the disposal of the Materiel Division of the Army Air Corps and Bureau of Aeronautics, Navy Department. With the cooperation of these departments, Curtiss designs and builds planes for every type of military and naval service.

The new Curtiss manufacturing plant, completed in 1930, is 300' wide by 1422' long. It contains 450,000 square feet of floor space. Adjacent buildings house the administration and engineering personnel

and the Curtiss Aerodynamic Laboratory, which includes the largest commercially operated wind tunnel in the United States.

The new Curtiss military developments are outstanding advanced types. They range from the Curtiss Goshawk, Navy F11C-2 Fighter (production line shown in the above photograph), to the Curtiss Shuttle, Army Ground Attack — reputed to be one of the world's most deadly weapons of aerial warfare. Every plane is a valuable contribution to the United States Government's first line of defense — the Air Force.

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NEW YORK



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signed to provide unexcelled accommodations for the pilot and two passengers. Windows are large. There's a speed ring and standard equipment—also a compass indicator—plenty of room for luggage. And design and construction throughout, of course, are typical of the thoroughness that Waco puts in every part of every ship.



The new 1933 Waco Model C four-place cabin ship is equally perfect, smooth and practical as the F-2. It combines the highest degree of comfort, refinement and performance.

The price, with Continental engine, 219 H.P., is \$11,025. With Jacobs engine, 175 H.P., \$1,142. Both prices include Trip.

For further facts it is so to be a Waco. Write to us, with our head office, or if you do not know his name, write us.

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CHRY CHRY



The new 1933 Waco Model A two-place cabin ship is equally perfect, smooth and practical as the F-2. It combines the highest degree of comfort, refinement and performance.

WARNING! The Waco franchise for 1933 often includes a real piece of advice. If licensed, we suggest that you get in touch with us at once.
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High Speed	182 m.p.h. at 5,000 ft.
Cruising Speed	165 m.p.h. at 5,000 ft.
Landing Speed	35 m.p.h.
Takeoff Run	170 feet
Rate of Climb	830 f.p.m. at 5,000 ft.
Climb to Ten Minutes	8,000 feet
Service Ceiling	18,100 feet
Absolute Ceiling	20,500 feet

The above figures represent the performance of the plane carrying ten passengers, their baggage, a crew of three and 900 pounds of cargo.

with normal fuel load of 205 gallons of gasoline and 20 gallons of oil.

WEIGHTS

Weight Empty	8,370 pounds
Useful Load	4,280 pounds
Payload	2,490 pounds
Gross Weight	12,650 pounds

(Signed)

F. B. Johnson
President, Boeing Airplane Company

GENERAL DESCRIPTION: The Boeing 247 is an all-metal, low-wing monoplane having retractable landing gear and two Pratt & Whitney Wasp developing 550 horsepower at 5,000 feet. Wing span, 71 feet; length 51 feet 4 inches. Complete navigation instruments. Sparses ventilated and insulated cabin. . . . Detailed specifications furnished on request. Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.



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in the NEW CONDOR TRANSPORT

The new Curtiss-Wright Condor, with its 22 ft. wing span, gross weight of about 16,000 lb., and 3,000 lb. payload, is setting a new standard in economical high speed transportation and passenger comfort. The fuselage of this new Condor, of Summerill Cheese-Metallic Steel Tubing, proves once again that Summerill Tubing keeps pace with engineering demands of the industry.

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Tapered Tubes called for by Engineering design were produced by SUMMERILL



PA-18 \$4940

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On the basis of such a past record **SKF** Bearings were automatically selected for the new Boeing transports being built for United Air Lines, the first of which has just been put into service. These ships are powered with two super-charged 550 H.P. Pratt & Whitney Wasp motors equipped with **SKF** Ball and Roller Bearings. These planes will cruise at 165 miles per hour with the engine set at 2000 R.P.M. They are capable of cruising from San Francisco to New York in 18 hours. And for this job, nothing could take the place of performance for "the fastest scheduled transports in the world."

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Four-passenger cabin plane
215 H. P. Lycoming Motor



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STINSON AIRCRAFT CORPORATION
Wayne, Michigan
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A LARGE, fast, efficient monoplane—twelve seats with Cirrus II-drive 95 H.P. or a Warner Scarab 125 H.P. engine, offers all the speed that can be given with safety—and an operating economy that respects a profit margin.

Two plane, side-by-side seating arrangement for capacity or more graceful student instruction—ample leg room and wide, deeply cushioned seats for most comfort. Plenty of space for baggage.

A more than built-up, such side of the cabin—staggered seats—occupies throughout, unobstructed visibility in all directions. Extra wide wing loading your feet over ground landing and takeoff—braking. A sturdy, comfortable, fast, economical plane—beautifully built and sold—The Fairchild 24.

For facts and how to buy the story. We want you to learn your own opinion of the Fairchild 24's ability, speed, economy and superior performance in the air. It makes this possible wherever you live. They can write for one more illustrated brochure, tell us when we may put a Fairchild 24 on your second stop for your inspection and trial.

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before this great new advance in high-speed, heavy-load flying



HERE is a plane that sweeps into the mainstream of airplane construction and design. That sweeps aside with them all previous standards for big plane performance. That makes a reality of what seemed, only yesterday, as ideal as it might in future years.

The new Martin Bomber gives to the United States Army the world's most effective weapon for aerial offense and defense. But the most important of the new plane is not confined to its military effectiveness. Flying men who witnessed its spectacular acceptance trials—who saw the tremendous speed and graceful ease with which it carried service loads—all recognized one fact: Here is a plane which, for transport operations, holds a great advance in pay load per mile per hour.

In the new Martin Bomber are embodied, for the first time, important new developments in airplane design, in construction, in method, in propulsive efficiency. These same developments, applied to commercial planes, will make possible a new type of transportation that will shrink distances, bringing closer together the people of the nation and of the world.



The Glenn L. Martin Company
Baltimore, Maryland, U. S. A.
Builders of Dependable Aircraft Since 1909

MARTIN MILESTONES			
First Martin Airplane	1909	First American Sport Monoplane	1914
Service Plane Ordered, Santa Ana, Calif.	1918	First All Metal Sea Plane	1920
First American Training Plane	1915	First Army Mail Mailplane	1924
First bomb-dropping experiments made by U. S. Government—Martin Plane used	1917	First Successful Heavy Plane for Aircraft	1926
First American Yale Cupus Bomber	1918	Rebombed Plane Ordered	1929
First Experimental Night Mail Plane	1925	Martin's Pioneer Bomber Built for U. S. Army	1926

American airplanes at home and abroad

ONE goes a long, long way back about 1911, there was a pilot who went about giving satisfaction at county fairs. There came a time when he shook his head in sorrow over the sad state into which aviation had sunk. It had, he said, become commonplace. He knew a bad, but correct the state of the body where he stepped no longer state his prayers for progress.

We have gone on from there, for twenty years. Standing at a point where people want to see an airplane fly so much the more rapid to which they now go to see Clyde Gusty, the world's first biplane gets, the deconstruction of aviation has steadily progressed until now the process is nearly complete. Over the past six or eight years we have been enjoying the signs of the days when the principal non-military use of the airplane was to make the passenger and the operator's flesh creep, and their hair stand on end. We have acquired a new tool. It is a perfectly amiable and respectable and respectable tool. It is a tool of many uses. One task has been to discover them. We are still, almost every day, discovering new ones.

It had been the summer to the fast-forward people who think that the limits of the airplane market have been reached, and that sales effort at all so present value. It is foolish to be over-optimistic, but it would be still more foolish to get trying. There are prospective purchasers who ever there are people who have a real use for the service of aircraft and that comes everywhere. To look over the items that Aviation has published last year under the heading of "Aircraft at Work" as to give an outline of the health and appearance of the potential market for planes and parts. To be sure, many of the people who have a real economic use for aircraft cannot be sold under present conditions. But they are all worth an effort, and if they can't be persuaded immediately at least the foundation can be laid for a sale in 1934 or 1935.

It has taken time to overcome the material inertia and timidity of business beings concerned with a new idea. The time can be shortened and the number of sales made can be increased in proportion to the amount of sufficiently directed effort that is devoted to the job. Too often we have tried to sell airplanes wholesale where we should have been selling them selectively. We have swept individual enthusiasts off their feet and persuaded them to buy, for industrial use, planes for which their companies had no legitimate employment except as an advertising stunt. When the first thrill wore off, or when some unexpected difficulty was encountered, the planes dropped into the second-hand market and we had made a new lot of mistakes.

In spite of all that, the airplane has clearly had considerable business potentialities in industry. It has been getting on one business plane after another. The wholehearted conversion of the oil industry was started several years ago, and they have never looked back. At the present time there are approximately eighty planes at work for the producers and consumers of petroleum products and for the makers of dehydrating machinery.

The newspapers were among the next to take an active interest. Two or three of the most important metropolitan papers keep planes as constant service, with apparently satisfactory results. The man who has perhaps had more experience than any other with the actual practical use of airplanes as journalists, Mr. Fennell of the Detroit News, recently got himself on record with the charming prophecy that American newspapers would need and would buy ten thousand airplanes within the next ten years.

The interest between some fell in line. Airplanes, including a number of American manufacturers, have been extensively used in Canada, in Mexico, in South America, in South Africa, and in Australia and New Guinea. Among the leading interests, as among the newspapers, there is still an



A Detroit paper boy gets a look
down at the new look the
cockpit of an airplane.

The airplane comes to the aid of the farmer. From the air he has been found one of the most effective means of combating destructive insects to help over his growing production.



RIGHT: An emergency shipment of automobile truck seats
are sent to aid Texas manufacturers in distress. The air-
plane is making thousands of dollars in collecting, this week
time for many industries.



open routes for a great many ships, both large and small.

Lumber companies, especially in Canada, have gradually come to recognize that they can save money by using air-
craft for carrying of timberlands and for transportation and fire patrol. Mining-petroleum companies, in addition to their more obvious activity of creating large numbers of planes to mine the fields run up and down the spine of the people in the 30-cent units, are using them to survey for location, to carry personnel and supplies, and to provide new points of view for efficient plans in pictures having nothing to do with aerostatics. They can see more. Public utilities need planes for survey work and for power-line inspection. There are 163 airplanes in use in American industry at the present time. Taking every precaution to be extremely conservative, it is safe to say that if every industrial executive in the country can be persuaded under to look into the relation of the airplane to his own business with a really open mind we are off at least another 200 planes for this sort of work within the next year, even under the present extraordinary difficult conditions. To prevent this sort of business men so obviously that they will begin with an open mind to open of themselves, and so that their final acceptance of the airplane may follow as a matter of course, is one of the special tasks of the sales department of an airplane company in 1935. This is no year for lying down on the job.

The government in Washington provides a further reminder of the extraordinary variety of uses that have been found for the airplane. Of the five departments of the federal government, seven are regular users of aircraft or are actively engaged in stimulating their use. To the War and Navy Departments the airplane is a major military instrument. The Department of Commerce is specifically



Aircraft extend the range of service both for business and pleasure. An airplane in airplane like an important place in the outgrowth of a modern country postman.



One of the flying boats
of the "distant" class
which carried into Alaska
to assist the merchant
in trouble.



A transport plane has been keeping the-
slipping crews in portlands and res-
cued in the White Watered Forest.



charged with providing aerial navigation, and it even had operators issue 48 planes of its own in its effort to that work. The Post Office Department has 40 aircraft under which the mail is being flown more than thirty million miles every year, in the United States and in more than twenty foreign countries. The Treasury Department uses airplanes, leaving the wings of the Coast Guard to stand guard against smuggling and to aid in protecting life at sea. The Department of the Interior uses aerial photography in the general work of the Geological Survey. They send it with particularly considerable efficiency and economy in the post-hunted aerial survey of Alaska. In a few months of flying the Alaskan Aerial Patrol several results that could only have been obtained in many years and at many times the cost by conventional surface methods, and it added new lakes and new mountains to the map of what was thought already to be a reasonably well-explored territory. In the Department of Agriculture the Weather Bureau makes contracts for daily exploratory flights into the upper atmosphere to measure the accuracy of forecasting. The Forestry Service uses airplanes for fire patrol; and the Bureau of Agricultural Research has taken immense interest in stimulating crop-raising from the air as a means of giving better and more crops at lower costs. There remain only the Departments of Labor, State and Justice, and although they have no direct connection with airplane operations they all make frequent air-minded contacts in connection with their law-enforcing and treaty-making duties.

It is in the service of industry and of the government that the airplane has most fully established itself. Flying for sport is as yet a minor part of aviation, but a growing one. The operators look it up to the present time had enough money to buy. Airports have often been too far away and in many cases too badly run. Many of them have

AMERICAN AIRPLANES

Curtiss-Wright

Curtiss-Wright Airplane Company

THREE more of Curtiss have been associated with American aviation since its earliest beginnings, and the Curtiss Aeroplane and Motor Company has figured prominently in military aeronautics from long before the War to the present day. Having a considerable output for Curtiss products, the Curtiss-Babcock Airplane Manufacturing Company was organized early in 1929, later succeeded by the Curtiss-Wright Airplane Company. The present factory was laid out originally in 1939 on the Lambert-St. Louis Municipal Airport. During the last few years these extensions have been made, so that today it covers some 150,000 sq. ft. of floor space. Another Curtiss-Wright subsidiary, the Curtiss Aeroplane and Motor Company, takes care of the purely military aviation business at a large new plant at Buffalo, N. Y.

The first product of the new organization was the OX-5 biplane, a three-place light monoplane. Later models were powered with Lockheed and Wright Whirlwind radial engines. During 1937 approximately 500 airplanes were produced at the new plant, most of which were Sabers and a few Thunderbolts. A highly sophisticated radial monoplane, early in 1938 the company took over the manufacture of the Curtiss biplane business from the North American Corporation of Lancaster, Mass., and in 1939 further extended the plant of its facilities by taking over the original plant and factory designs of the Travel Air Company of Wichita, Kan. During 1939 the Curtiss-Wright plant set its organization, a 41 sq. mile tract of open airport land. In spite of general commercial depression conditions since 1930 of this type were sold

in the same year. During 1939-1940 (Whirlwind 2800) Kingbird monoplanes, a new built and sold to Eastern Air Transport line, and the United States Navy. The Curtiss-Wright company an airplane from a design intended originally for a light bomber for the Air Corps was also produced and put into service on domestic air transport lines.

The 1932 production was limited to sixty orders on hand, and the plant continued on the spot and spreading models described below. During the latter part of the year an entirely new design for the Curtiss was laid down and orders received and put into production for new ones intended for General Air Transport and American Airlines. Again in 1932, airplanes will be built to order only in low general model groups which report the freedom to build in industry, expansion, and design. The Sabers and the Curtiss Thunderbolts, Curtiss-Wright products, are distinguished through a sales expansion of over 100 dealers and distributors throughout the United States.

The Speedwing and the Osprey

REPRESENTATIVE of Curtiss-Wright open cockpit airplanes is the Speedwing, a high performance biplane. It was designed to meet the needs of the army and navy in the air, and in 1935 further extended the plant of its facilities by taking over the original plant and factory designs of the Travel Air Company of Wichita, Kan. During 1939 the Curtiss-Wright plant set its organization, a 41 sq. mile tract of open airport land. In spite of general commercial depression conditions since 1930 of this type were sold

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The Condor

WHILE the war effort demands fast and reliable aircraft, the Curtiss-Wright Condor is a three-place open cockpit monoplane. It was designed for general training and open personnel transport. It was built for the Wright Company engine. It was later modified for General Motors and Whittle Whetstone power. Present plans are being spread the last model, a 170-hp. biplane model. The open is now 2 ft. less than that of the Speedwing and the Condor model. It is built with the speed of 120 mph. The airplane has 24,000 P.A.P.

The Sabers

THE experience behind the Curtiss-Wright Sabers and the Travel Air Thunderbolts has been combined to produce the Curtiss-Wright Sabers, a single monoplane of light design which has appeared in 1932. Its high

AMERICAN AIRPLANES

Curtiss-Wright • Aeroac

monoplane was a direct result of the leading and better known. The materials and type of construction are conventional, light, open, and 1000 lbs. weight and 1000 lb. weight. The Curtiss-Wright Sabers, a single monoplane of light design which has appeared in 1932. Its high

The Condor

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Aeronautical Corporation of America

THE first Aeroac, a single seater, was designed by Wright Flight Division, Ohio, by D. A. Smith, and was designed by Major General. In 1939 a company was organized for its own production. The Aeroac ATC light airplane was produced in the Aeroac C-2 and Aeroac C-3. The Aeroac was built with a two-place open cockpit monoplane design. The Aeroac was built with a two-place open cockpit monoplane design. The Aeroac was built with a two-place open cockpit monoplane design.



AMERICAN ENGINES

AMERICAN ENGINES

Kinner • Lycoming

Continental Aircraft Engine Company

FROM automobile to aircraft engine is not an enormous task, and one which was made by Continental Motors early in the summer of 1929. At that time Continental Aircraft Engine Company of Detroit was organized as a wholly-owned subsidiary, and went about the development of a seven-cylinder radial engine. The development of the original design is on the market today as the 160-hp. Model B-579. Two years ago, Continental brought out the Model A-48, a four-cylinder opposed air-cooled engine rated at 20 hp. This model is on the way to such machines as the North American and the Taylor Cub.

The seven cylinders of the B-579 are of tapered cast machined barrels and arranged on aluminum-alloy heads. The two valves in each cylinder are operated by the conventional push rod and rocker arm mechanism, but the latter differs from most radial engines in that the valve gear is operated from the rear of the engine, the valves being mounted in the rear half of the combustion chamber in the rear. Aluminum pistons are used, and the connecting rod is of the usual wrist pin and universal joint type. Crankshaft is of the two-piece, crank type. Piston and connecting rods are turned out on the rear end of the crankshaft. Each cylinder is provided with two valves operated by direct action through tappets from a camshaft on the rear end of the crank below the main crankshaft.

In the A-48 the two opposed banks of four cylinders each are cast as integral units and are mounted on the sides of a box-like aluminum-alloy crankcase. Crankshaft is of the three crank type mounted with the engine. Piston and connecting rods are arranged so that the engine naturally can be easily mounted when necessary and that the engine can be used in various positions without need for any special mounting. The engine is of the type which can be used in various positions without need for any special mounting. The engine is of the type which can be used in various positions without need for any special mounting.

The two-piece, crank type. Piston and connecting rods are turned out on the rear end of the crankshaft. Each cylinder is provided with two valves operated by direct action through tappets from a camshaft on the rear end of the crank below the main crankshaft.

Engines	B-579	A-48	A-48
Displacement	20.1	2	4
Rev. per min.	2,400	1,800	1,800
Weight	100	100	100
Weight per hp.	4.9	1.1	1.1

Jacobs Aircraft Engine Company

ALTHOUGH the Jacobs Aircraft Engine Company was incorporated in June, 1929, it was a direct outgrowth of the Fokker Aircraft Company, which was organized in 1921, whose principal business was to design and build naval aircraft engines, using gas turbine and aircraft engines.

In 1929 the Jacobs Aircraft Engine Company, formed by a substantial group of young Philadelphia business men, began essentially as a design and assembly and having all of the engine parts machined in their facilities and under their supervision, and assembling and block testing the engines in their own plant. In 1932 the Jacobs company produced the first engine ship property and equipment of the carrier light manufacturing & assembly company in Philadelphia, Pa., and with the addition of new, open-day production machine tools, it is now in a position to manufacture all of the major parts of its engines. The company is carrying on a progressive engineering development program with a view to offering a complete new line of aircraft engines, as well as the conventional machine tools for their use.

The general construction features of Jacobs engines follow general standards. Particular attention has been paid to the maintenance features of the design and the seven-cylinder engines are also complete with rigidly mounted ring, cooling and lubrication systems, it is desired the block permanently mounted to a physical mounting board designed to be bolted directly to the fuselage. The engine design, however, is only to provide those groups of aircraft for the mounting board and to face the engine with the fuselage.

The Jacobs (B-579) engine is used by the West Aircraft Company in a standard power plant in its Model A-48 (One piece side-by-side) and Model P-3 (One piece side-by-side) engines, and by the First Aircraft Corporation in one of its three-cylinder engines.

Engines	B-579	A-48	A-48
Displacement	20.1	2	4
Rev. per min.	2,400	1,800	1,800
Weight	100	100	100
Weight per hp.	4.9	1.1	1.1

CONTINENTAL B-579

JACOBS LA-1

Kinner Airplane & Motor Corporation

ONE of the first of the new automobile industries to emerge after the close of the War was the Kinner Airplane & Motor Corporation, organized under the laws of California in 1919. When, early in 1925, statistical studies indicated that 75 per cent of all commercial planes then being manufactured were powered with engines of 50 to 100 hp. (the average of the average 125-hp. engine was estimated as 100 hp. in 1925), the K-5 which appeared in 1925 is designed as an intermediate plane between commercial and military, and the first was converted to a fixed landing on (K-5) (K-5), with a 100-hp. engine. The first engine was converted to a fixed landing on (K-5) (K-5), with a 100-hp. engine. The first engine was converted to a fixed landing on (K-5) (K-5), with a 100-hp. engine.

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Engines	B-579	A-48	A-48
Displacement	20.1	2	4
Rev. per min.	2,400	1,800	1,800
Weight	100	100	100
Weight per hp.	4.9	1.1	1.1

Lycoming Manufacturing Company

DURING the early part of 1928 the Lycoming Manufacturing Company, long known as a manufacturer of engines for automobiles, trucks and boats, entered the aircraft engine field. Shortly thereafter the Lycoming Manufacturing Company was organized as a separate corporation, and the first engine was converted to a fixed landing on (K-5) (K-5), with a 100-hp. engine. The first engine was converted to a fixed landing on (K-5) (K-5), with a 100-hp. engine. The first engine was converted to a fixed landing on (K-5) (K-5), with a 100-hp. engine.

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Engines	B-579	A-48	A-48
Displacement	20.1	2	4
Rev. per min.	2,400	1,800	1,800
Weight	100	100	100
Weight per hp.	4.9	1.1	1.1

KINNER B-5

LYCOMING B-680-5A

AMERICAN ENGINES

The Pratt & Whitney Aircraft Company

IN the fall of 1923 the Pratt & Whitney Aircraft Company was founded at Hartford, Conn., by Frederick B. Rowland, George J. Mind and a group of aviators who were particularly interested in the development of radial air-cooled engines. Located shop space was leased from the Pratt & Whitney company, and the first Wasp engine, a four-cylinder powerplant of approximately 400 hp, was produced. By the fall of 1929 the original twenty-two-man shop had expanded to cover four full floors of the Pratt & Whitney factory, and output was being produced at the rate of about 700 per month. With the formation of United Aircraft & Transportation Corporation, the Pratt & Whitney Aircraft Company went in as an engine manufacturing subsidiary, and a thoroughly modern factory with over 800,000 sq ft of floor space was constructed in East Hartford to house or use how all commercial, production and testing operations. The present capacity of the plant is approximately 800 engines per month. Up to Jan. 1, 1952, a total of 10,000 engines had been delivered by the company of which 1,200 are now in active operation on the shelves of the world.

Twin and Wasp engines were used by Amelia Earhart, Curt and Gerty, Panhard and Rhodes, Warren and Griffins and many others on spectacular trans-oceanic flights. Present land-

plane speed records for both men and women were set by Max Janus, Donald and Max Hooton in Wasp and Wasp Junior powered ships.

The original Wasp design had 1,245 cubic displacement. With the demand for higher powerplant units, the Wasp series was put in production of which two sizes are available—1,200 cubic and a 1,600 cubic model. Later the Wasp Junior featured with a displacement of 900 cubic. Recent advances have pushed the demand for more powerful units beyond the limits of the Wasp series, and latest developments were started two years ago on the double row arrangement. A 1,200-cubic model was built and tested, but has never been put into production. Recently, however, two twin-row models have been made available commercially—the new Wasp Junior with a displacement of 1,525 cubic, and the new Wasp at 1,600 cubic.

All P & W cylinders are cast and forgings with integral aluminum alloy heads bolted down to forged aluminum alloy cast undercarriage. Each cylinder undercarriage has large diameter inlet valve set at approximately 50 deg from the horizontal. Valves are operated by pushrods through intake valve stems. Pushers are of integral aluminum, and connecting rods of forged steel. Master rods are of the solid wedge type in which the big ends are joined through bronze bushings. Forged steel crank shafts are in two-piece bolted together

through the journals. The engine is divided into four main sections: a nose section which contains the propeller thrust bearings, retaining gearings (if any), and the valve operating mechanism; the main crank section operating cylinders and crankshaft; the Wasp series which contains a General Electric type supercharger, and the rear of an auxiliary section on which are mounted inspection window, oil pump, and oil draining gear set. In the double row type the essential difference exists in the main section. Cylinders are arranged in two banks of seven each, staggered, and the main crankshaft sections are in three parts instead of two. The crankshaft is a double throw type, and two connecting rods of master and link rods are used. As in the normal arrangement, the main propeller takes care of the valve operating mechanism for the front bank of cylinders, and the rear set of valves are operated from an intermediate section between the main crankshaft and the Wasp series. At present details the twin-row model are similar to the single-row type (See Aviation, April, 1952).

A recent addition to all Pratt & Whitney engines is a special valve mechanism in the nose piece for the operation of Hamilton Standard hydraulically operated controllable pitch propellers. Features for the control mechanism is obtained by bleeding off from the lubricating system of the engine

Model	Wasp Jr.		Wasp										Twin Wasp	
	4	55A	C1	3C1	7121	7122	814	100-4	771	910	100-1	100-2	100-3	100-4
Displacement	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Max. hp	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rated hp	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rated r.p.m.	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crane lift	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Weight dry	—	—	—	—	—	—	—	—	—	—	—	—	—	—

(Continued on inside opposite page)

*Weight due to engine base with other engine in weight

†Weight due to engine base with other engine in weight



AMERICAN ENGINES

Menasco Manufacturing Company

BY the end of the supply of war-time C43s was in sight and A. S. Menasco and Karl Wether founded Menasco Motors, Inc. in February of 1947 with the purpose of developing an economical power-plant in the 70 to 100 hp range. The company was incorporated in March 1948, and moved recently the assets had been purchased by a group of venture business men headed by Douglas O. Shuman at Los Angeles. A round corner, box has been located to be known as the Menasco Manufacturing Company.

Range for one level power where a small European radial engine was mounted under hood the company has developed an four- and six-cylinder in-line air cooled engine a type which has

exceeded great popularity abroad. The Menasco company now holds five approved type certificates and holds three standard production models. In addition there are three prototype engines of higher horsepower ratings which have been developed for various purposes. Menasco engines have performed notably in small airplanes at the National Air Shows for the last three years.

The current Menasco models are all of the inverted type. The cylinders are castings with metal nut on barrels and desirable aluminum alloy heads. Valve stems and spark plug bushings are in-line. Piston and crank rods through the head joining the cylinders in the southeast. Aluminum-alloy pistons are control on forged

aluminum connecting rods. Crankshafts are heat-treated malleable-iron forgings machined all over. Substantial bronze bush bearings are used throughout. A drop frame ball bearing (conspicuously located) the propeller hub takes the thrust. Lubricating system is the full three feed type with dry pump. Stranding camshaft and two Scotch air shafts operate an standard pump. Special nose cooling and air scoop provide adequate cylinder cooling.

Displacement	8-4	6-4	4-4
Max. hp	—	—	—
Rated hp	—	—	—
Rated r.p.m.	—	—	—
Crane lift	—	—	—
Weight dry	—	—	—

Warner Aircraft Corporation

OCTOBER 1926 was the founding of Aeromarine Industries, Inc., under the direction of W. A. Warner, who was then designing the Scarab engine. Later (1927) the company was reorganized, and the name changed to the Warner Aircraft Corporation. The new power plant was officially introduced into the industry at the All-American Aircraft Show in April, 1928. During the better half of that year the engine was prominently at the National Air Fair, the New York Los Angeles Club A Derby, and the National Air Show. Later models also made notable showings in the 1931 and 1932 Air Races. Its earlier record brought an increased demand and made it necessary to expand the manufacturing facilities. Now available, a 64-sq-ft tract of land at 30,500 Monroe Avenue, Detroit, was purchased, and a modern factory erected. The plant has a capacity of ten engines per day.

All Warner cylinders are machined from

steel forgings, and the hot-treated steel connecting rods are drilled and bolted to the barrels. Pistons are pressure-mold castings of aluminum alloy. Connecting rods are function forgings, machined all over. The master rod is a light type, a four-bar design with counter-bore, one leader bearing at the crankpin end. Leader rods are attached to the master rod by means of wrist pin working in bronze bushings. The crankshaft is made in one piece from an alloy steel, deep forging machined all over. It is of a one-throw design with bronze counterweights rigidly fixed to the crank cheeks. The main case is in two halves joined at the cylinder center line. It is made from heat-treated steel, malleable, and is provided with a large number of internal stiffening ribs.

Each cylinder is fitted with two valves set at an angle into the head. Valves are actuated from a cam ring carried on the rear end bearing out and driven by spur gears from the crankshaft. The valve arrangement on the cylinder heads shows clearly from small American practice in that the valve stems and wrist pins are not enclosed in boots.

An additional addition is employed for a more ample stroke multiplied in due to a motion of the master rod with offset in each cylinder and as resulting in the master rod to which the crankshaft is attached. The master piston and wrist pins, which is bolted to the rear of the extension housing, carries two rings, oil pump on 20,000, and oil pressure relief valve. Spots is provided for mounting a starter between the magneto.

Displacement	Warner		Warner	
	8-4	6-4	4-4	2-4
Max. hp	—	—	—	—
Rated hp	—	—	—	—
Rated r.p.m.	—	—	—	—
Crane lift	—	—	—	—
Weight dry	—	—	—	—



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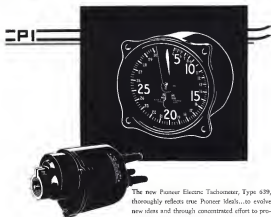
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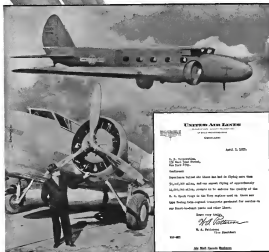
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